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ABSTRACT

This document reports the test of an experimental procedure designed by the Albany Medical College (AMC) to systematically reduce a large pool of applicants to one of manageable proportions for interviewing purposes. Data on nine predictor variables were coded and keypunched on 80-column cards for each applicant to September 1972 and 1973 admission. All applicants who obtained a predicted preclinical average of 85.4 were classified as "interviewable;" those with an average below 80.0 were classified as "rejected" and applicants with averages between 80.o and 85.4 were "marginal." To test the efficacy of using the proposed analytic procedure for determining the interview status of applicants, a comparison was then made between screening results derived by computer and those of the AMC admissions screeners. Preliminary results indicated that nearly 40% savings in time has accrued from using this new procedure. AMC admissions screeners have found it easier to screen applicants which have been placed into selected categories beforehand. A 12-item bibliography is included. (Author/MJM)

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# THE COMPUTER SCREENING OF MEDICAL SCHOOL APPLICANTS*

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The Albany Medical College

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A problem of major proportions facing the admissions departments of medical schools is the rapid growth in the number of first year applications as compared to the number of available first year places for study (Dube et. al., 1971; Green, 1972; Stritter et. al., 1970, 1971). The Albany Medical College (AMC) has experienced over a 65% increase in the number of applications to first year study since the 1969-70 applicant season. First year applications numbered over 3,000 for September 1972 admission and over 4,000 for September 1973 admission. The completion of new and expanded medical school facilities in September of 1972 increased the number of places offered for first year study from 80 to 110. This overwhelmingly large ratio of number of applicants to number of available places for study surely demands a responsive and efficient system for processing applicant credentials. An important outcome of this system should be that highly desirable candidates are interviewed as soon as possible and clearly undesirable candidates are eliminated from consideration immediately. Thusly, not only would the likelihood of securing top quality students be enhanced, but also, a basis would be provided for examining in closer detail, those students with marginal records who might potentially represent desirable candidates for study. An exploratory, collaborative study was undertaken with the AMC office of Admissions and Student Records to meet this challenge. Its purposes were: (a) to investigate the results of employing an analytic, computer-based methodology for examining the undergraduate records of medical school applicants, with the end of determining interview status; and (b) to compare the computer derived results with the qualitative judgments of the AMC admissions screeners.

Stepwise multiple regression procedures (Draper and Smith, 1966) were employed to predict applicant preclinical (first two years) averages, which were in turn used as measures of interviewability. Multivariate methods have been used in previous studies to predict academic success (see Brading, 1971 for a review) and to aid admissions committees in the selection of medical students (Best et. al.,

1967, 1971; Conger and Fitz, 1963). The latter studies emphasized the use of statistically weighted measures for supplementing the subjective judgments of admissions screeners in selecting students for medical study. The intent of the present study, however, was not primarily one of ranking students for purposes of selection. Rather, the goal here was to test an experimental procedure for systematically reducing a large pool of applicants to one of manageable proportions for interviewing purposes. In this manner, a sequential strategy for determining the interview status of applicants was proposed. Specifically, the regression procedures would be applied to the records of all applicants, placing them into three categories: (a) highly qualified applicants who ought to be interviewed as soon as possible; (b) applicants with clearly unacceptable credentials who ought to be rejected immediately; and (c) applicants with questionable records who should be considered in closer detail before a determination of interview status could be made. Records of applicants in categories (a) and (b) above usually manifest themselves quite clearly. Thus it was felt that applicants placed in these categories by the computer procedures could be interviewed directly (or rejected immediately) without being subjected to the usual time consuming process of multiple screenings. (Prior to this study each applicant was humanly screened at least on two occasions, and in some cases, on three occasions, before a decision was rendered regarding his/her interview status.) This projected savings in numbers of screenings would allow more time for the admissions screeners to direct their attention to students with questionable credentials. Consequently, this strategy would help to insure that highly qualified and clearly desirable candidates were afforded top priority in passing through the necessary admissions channels and that valuable screening time was not lost in examining the records of clearly undesirable candidates.

IT IS IMPORTANT TO NOTE THAT IN THIS STUDY NO DECISIONS REGARDING THE INTERVIEW STATUS OF APPLICANTS WERE ACTUALLY MADE SOLELY ON THE BASIS OF THE COMPUTER DERIVED RESULTS. The reader will recall that one aim of the present study was to compare the computer derived screening results with those of the AMC admissions screeners. To this end each applicant was humanly screened at least once.

Selection of Predictor Variables

Initial selection of predictor variables was based on the findings of previous prediction studies cited above, results of a questionnaire directed to medical schools regarding the use of predictive data for medical school admissions (Hamberg et. al. , 1971) and suggestions offered by the AMC Director of Student Admissions. An initial pool of 15 predictor variables was entered into a regression equation using preclinical (first two years) average as the criterion variable. The hypothesis or estimation-generating sample was comprised of students in the AMC graduating classes of 1969, 1970 and 1971; total sample size was 176. Five of the original variables, namely PREMEDICAL INSTRUCTORS RATINGS, SEX, MOTHERS OCCUPATION, MEDICAL COLLEGE ADMISSIONS TEST (MCAT): GENERAL INFORMATION SUBTEST and MCAT: OVERALL were subsequently eliminated since these variables contributed only negligible increments to the multiple correlation coefficient, written $\underline{R}^2$. One additional variable, UNDERGRADUATE SCIENCE GRADE POINT AVERAGE, was also eliminated from study since the relevant variance for this variable appeared to be accounted for by two related variables, (OVERALL) UNDERGRADUATE GRADE POINT AVERAGE and REQUIRED COURSES AVERAGE. Table 1 contains a brief description of the remaining nine predictor variables which were included for study. $\underline{R}^2$ for these nine variables using the hypothesis-generating sample noted above was 0.54. Table 2 contains the raw regression coefficients which were derived for these data. Variable 6 (OVERALL) UNDERGRADUATE GRADE POINT AVERAGE received the largest estimation weight, a result which is consistent with the widely drawn conclusion that the single best predictor of future academic success is past academic performance.

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INSERT TABLES 1 AND 2 ABOUT HERE
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Procedure

Data on the nine predictor variables were coded and keypunched on 80-column hollerith cards for each applicant to September 1972 and September 1973 admission. Estimation weights derived using the hypothesis-generating sample were applied to the coded scores of each applicant, resulting in a predicted preclinical average. The mean predictedpreclinical average (85.4) computed for the total pool of applicants who were accepted for September 1971 admission was chosen as the cut-off point for determining those students who were to be classified as interviewable. That is, all applicants who obtained a predicted average of 85.4 or higher were classified as "interviewable". Further, applicants whose predicted average fell below 80.0 were classified as "rejects". Applicants whose predicted average fell between 80.0 and 85.4 were classified as "marginal", indicating that a closer, more detailed examination of their records was required before a determination of interview status could be made. Each applicant was also humanly screened at least once by one of the AMC admissions screeners. To test the efficacy of using the proposed analytic procedure for determining the interview status of applicants, a comparison was then made between screening results derived by computer and those of the AMC admissions screeners.

Results and Discussion

Figure 1 depicts the percent agreement between screening results based on the statistically weighted measures and those of the Admissions Committee screening procedures. Data summarized in the figure are based on results for September 1972 admissions. Data for September 1973 admissions were not completely analyzed at the time of this writing, however, a partial comparison yielded a similar configuration. Reading from left to right, entries in the top and bottom halves of the

figure sum to 100 per cent. This corresponds to a comparison of the results given by the two procedures using the analytic procedure as the control variable in each case. Entries in the upper right-hand and lower left-hand quadrants were designated as "hits" since screening results from both procedures were in agreement. As can be seen, the extent of agreement in the hits category ranged from 63.6% to 78.2%, a preliminary result which was encouraging. Entries in the upper left-hand quadrant were labeled as "false positives" (Cronbach, 1960). This category included those cases in which the analytic procedure classified applicants as interviewable and the Admissions Committee screening procedures classified applicants as non-interviewable. Two hypotheses were advanced to explain this apparent screening discrepancy. In some cases applicants with near marginal records also had uncommonly high entering ages, this fact alone spuriously inflating the value of the predicted criterion to exceed the cut-off point. Consequently, the analytic method classified these applicants as interviewable, while the Admissions Committee screening procedures classified them as non-interviewable. In other cases it was felt that certain geographical and undergraduate college considerations relative to class balance influenced the decisions of the Admissions Committee screeners in classifying applicants as non-interviewable.

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INSERT FIGURE 1 ABOUT HERE
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Entries in the lower right-hand quadrant were labeled as "misses". This category included cases in which the analytic procedure indicated a non-interview status and the Admissions Committee screening procedures indicated an interview status. Three hypotheses were advanced to explain this apparent screening discrepancy. In some cases students who had demonstrated generally poor academic performance in the first two years of undergraduate study, but greatly improved performance in the last two years of undergraduate study, were considered by the Admissions Committee screeners as potentially good candidates and consequently, in-

terviewable. In other cases, students who had demonstrated marginal academic records on the undergraduate level, but who had excelled on the graduate level, were classified as interviewable by Admissions Committee screening standards, and non-interviewable by the analytic procedure. In still other cases, applicants with special dispositions (i.e., alumni children, expressed faculty interest, minority group status, etc.) were afforded additional careful scrutiny by the Admissions Committee screeners in the determination of interview status. This of course, was not possible in the case of the analytic procedure.

Another source of error which was believed to be potentially responsible for some of these discrepant cases was a low inter-rater reliability among the judgments of the Admissions Committee screeners. The degree to which low inter-rater reliability affected the results of this study, however, appeared to be inconsequential. An analysis of inter-rater reliabilities among those cases requiring multiple screenings yielded Pearson-rs in the low to middle .80s.

Findings such as those summarized above offered important suggestions regarding the adjustments which are needed to improve the accuracy of the prediction procedure. For example, last two years grade point average may be an important variable to include in the set of predictor variables. Also, certain prescribed indicators should be included in the computer program printout to flag students who have special dispositions, graduate school records and above average entering age.

## Conclusions

An experimental, analytic computer-based methodology for determining the interview status of medical school applicants was tested in a limited setting and provided encouraging results. As a consequence of comparing the results of two alternate strategies for determining the interviewability of applicants, certain refinements were indicated which would improve the predictive accuracy of the experimental procedure. Preliminary results indicated that nearly a 40% savings in time has accrued from using this new procedure. AMC admissions screeners have found

it easier to screen applicants which have been placed into selected categories beforehand. An apparent drawback in this process, however, is the amount of time required to code and keypunch the data necessary for the computer program. Problems such as these might easily be resolved by using special forms designed to be directly converted into card images by electronic processing (see Rankin et. al, 1972).

Although additional experimentation with the methods reported in this study is indicated before general applications can be recommended, results of this study have shown the potential usefulness of employing analytic methods as a valuable aid in processing the undergraduate student records of medical school applicants.

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TABLE 1

DESCRIPTION OF PREDICTOR VARIABLES INCLUDED FOR STUDY

| Number/Code | Description |
|---|---|
| 1. AGE | Age of applicant at time of application. |
| 2. COLRNK | Internal mechanism for ranking undergraduate colleges, based on Medical College Admissions Test (MCAT) average scores earned by students at that institution. |
| 3. MCATVB | Verbal subtest of the MCAT. |
| 4. MCATQN | Quantitative subtest of the MCAT. |
| 5. MCATSC | Science subtest of the MCAT. |
| 6. UGA | (Overall) undergraduate grade point average of applicant. |
| 7. FATHOC | Applicants fathers occupation, based on a 7-point scale. |
| 8. EXTCUR | Undergraduate extra-curricular activities of applicant, based on a 12-point scale. |
| 9. RQDCRS | Grade point average of selected courses required for admission, including introductory biology, chemistry and physics and organic chemistry. |

TABLE 2

RAW REGRESSION COEFFICIENTS DERIVED FOR NINE PREDICTOR VARIABLES ($R^2 = 0.54$)

| Variable | Coefficient |
|---|---|
| AGE | 0.2880 |
| COLRNK | 0.1028 |
| MCATVB | -0.0068 |
| MCATQN | 0.0060 |
| MCATSC | 0.0066 |
| UGA | 4.2160 |
| FATHOC | 0.1363 |
| EXTCUR | -0.2251 |
| RODCRS | 0.4631 |

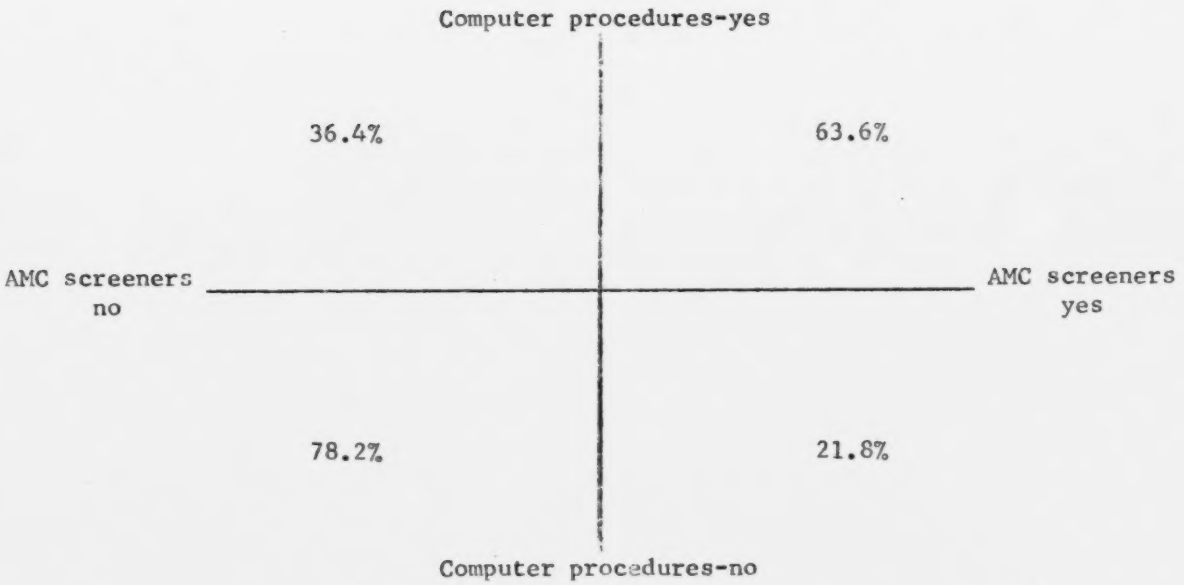


Figure 1 - Percentage agreement between screening results - based on a comparison of results given by the analytic computer-based method and those of the AMC admissions screeners.